

Solid Oxide Electrolysis for Oxygen Production in an ARS, Phase I

Completed Technology Project (2006 - 2006)



Project Introduction

Paragon Space Development Corporation proposes an innovative, efficient and practical concept that utilizes Solid Oxide Electrolysis for regenerative air revitalization. The concept is innovative because it safely eliminates handling of hydrogen, and works irrespective of gravity and pressure environments with no moving parts and no multi-phase flows. The innovation is efficient because it requires no expendables while being compact with minimal impact on mass. The innovation is practical because it evolves from the well-established, current state of the art in oxygen production for the regenerative air revitalization system slated for the International Space Station. The approach proposed addresses the crux of the innovation in Phase I through modeling and experimentation to immediately identify the most feasible approach to its implementation. Phase II will encompass more detailed experimentation to optimize the subsystem design resulting in a fully functioning regenerative oxygen subsystem for advanced life support. The consequence is significant because solid oxide electrolysis is an inherently suitable technology (and possibly the only technology) for enabling 100% oxygen regeneration from carbon dioxide and water vapor, two byproducts of crew activity that must be managed regardless.

Anticipated Benefits

Potential NASA Commercial Applications: The Solid Oxide Electrolysis innovation proposed for advanced life support systems will enable more efficient, compact systems to be used in terrestrial applications. Examples include: - Oxygen regeneration subsystems for the DoD and Home Land defense life support systems in chemical warfare agent shelters. - Oxygen regeneration systems for the Navy and ocean research institutions developing submersibles or underwater research stations. - Emergency fuel cell systems for both applications stated above since solid oxide electrolysis cells can be operated as a fuel cells.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

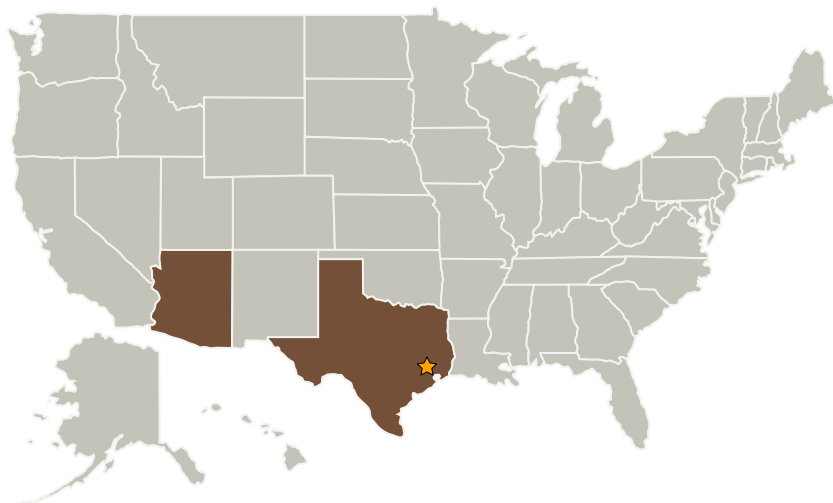
Small Business Innovation
Research/Small Business Tech
Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Paragon Space Development Corporation	Supporting Organization	Industry	Tucson, Arizona

Primary U.S. Work Locations

Arizona	Texas
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Christine Iacomini

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.1 In-Situ Resource Utilization
 - └ TX07.1.3 Resource Processing for Production of Mission Consumables